

parts of the work that are purely or predominantly ethnological, but would like to draw attention to those sections which are most important for eugenically-minded readers.

The third and fourth chapters, and to some extent also the fifth, are devoted to a discussion of the hereditary differences between social strata, and to the phenomena of differential fertility. Race mixture is treated in the sixth chapter and comparative race psychology—including the results of intelligence tests—in the ninth. The last section of the book deals in a very interesting manner with the problem of contact between different races and civilizations and its social and political aspects throughout the world.

Muehlmann's book contains many statistical tables and charts and a beautiful bibliography. Although I am inclined to disagree with the author on a large number of points, I sincerely enjoy the opportunity of presenting his work to English readers. It is a fine scientific achievement, both informative and thought-provoking.

C. TIETZE.

## MATHEMATICS

**Hogben, Lancelot.** *Mathematics for the Million.* London, 1936. G. Allen & Unwin. Pp. 647. Price 12s. 6d.

THE reviewer comments on this book not as a mathematician but as one of the millions for whom it is written. In the attempt here to popularize mathematical knowledge, Professor Hogben has achieved a remarkable success. He has made, from what to many people have seemed dead bones, an impressive resurrection, animating in turn geometry, algebra, trigonometry, graphs, logarithms, the calculus, probability, and statistical methods, and reviving hope in minds which thought that mathematics meant slow learning, quick forgetting, and no more reunion. The numerous diagrams, drawn by J. F. Horrabin, are an attractive and essential supplement to the text.

This book was written to pass the time when the author was in hospital, but its

purpose was not the less ambitious for that. In the new civilization now shaping itself, in which science as means and end is playing a leading part, the common man must be enabled to maintain a broad understanding of the organized body of knowledge which science represents. "Protestant reformers," says Professor Hogben, "founded grammar schools so that people could read the open bible. The time has now come for another Reformation. People must learn to read and write the language of measurement so that they can understand the open bible of modern science."

His method is admirably calculated to accomplish the end in view. It is indicated by the title of the first chapter: "Mathematics, The Mirror of Civilization." Mathematics is shown as a collection of mental tools which man has been impelled to invent or discover through the ages in order to meet the exigencies of his contemporary needs. Thus the properties of the triangle came to be recognized through the practical schemes of irrigation and land surveying carried out by the ancient Egyptians. Later, spherical trigonometry was developed as a response to the needs of the great navigators. The demands which the opening of ocean passages made upon astronomical mathematics helped to evoke logarithmic methods of calculation while the laws of mechanical motion newly manifested in artillery and clocks paved the way for the calculus. Mathematics, it is urged, has always drawn its most fruitful inspirations from the common social culture. Whenever culture loses contact with the common life and becomes the plaything of a leisure class, it becomes priestcraft and superstition, the end of progress in knowledge. The democratization of mathematics, declares Professor Hogben, must be regarded as a decisive step in the advance of civilization and one upon which depends the planning of a rational society with leisure and plenty for all.

There is a lucid and useful chapter on "The Arithmetic of Human Welfare," in which biometrical methods are outlined. Though at great pains to explain the tools of science to the man in the street, the

author is not less anxious to prevent their being regarded as fetishes. Thus, characteristically, he describes the correlation coefficient as merely a measure of resemblance, throwing no light on the mechanism connecting two phenomena and only to be regarded as a recipe for action in that it points the way to further investigation or experiment.

In this work there are a number of comments on eugenics and eugenists. Professor Hogben unfortunately appears to regard these terms as synonymous with reaction and reactionaries. Genetic just like mathematical data may indeed often have been the subject of biased rationalizations. But is it necessary to reject the calculus because Newton was superstitious about some things, or to disparage the significance of the hereditary factor because some people try to turn it into a defence mechanism in regard to income-tax? The democrati-

zation of mathematics must surely involve, at some point, educability as well as education. In truth, Professor Hogben is only at the beginning of his real task in the very valuable work of popular enlightenment he has here given us. If mathematics and science are to be understood and used by the whole body of society, then we must diffuse, as well as education, the genetic bases of understanding. The real eugenics is not an excuse for preserving the privileges of a minority, but an attempt to socialize the germ plasm of the best, to make the inborn nature determining the fine brain of the great mathematician or scientist the equal right of every child brought into the world. Immensely difficult—perhaps. But surely not antagonistic but entirely complementary to Professor Hogben's purpose of a planned democratic society, with every man a mathematician.

HERBERT BREWER.

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